

*Amendments to the Claims*

1. (Currently Amended) A computer implemented method of analyzing [selecting one or more compounds from] a virtual [combinatorial] library [associated with R reagent combinations], comprising [the following steps]:
- (a)[.] selecting a [first] set of N reagent combinations from the [R reagent combinations associated with the] virtual [combinatorial] library, wherein said selected N reagent combinations represent a set of N compounds [N < R];
- (b)[.] enumerating said [first] set of N [reagent combinations to produce a first set of F enumerated] compounds;
- (c)[.] selecting M compounds from said [first] set of [F] N enumerated compounds[, wherein M < F];
- (d)[.] deconvoluting said M compounds into their associated building blocks [reagents];
- (e)[.] generating a focused library of at least one compound based on said building blocks [reagents]; [and]
- (f)[.] enumerating [a plurality of reagent combinations associated with] at least one compound in said focused library of at least one compound [to produce a second set of S enumerated compounds.]; and
- (g) outputting a list of at least a portion of said enumerated focused library of at least one compound.
2. (Currently Amended) The method of claim 1, wherein said focused library of at least one compound includes a plurality of compounds. further comprising [the step of]:
- (h)[g.] selecting at least one K compound[s] from said [second set of S] focused library of compounds, wherein step (g) comprises outputting a list of said at least one K compound [ enumerated compounds, wherein K < S].

3. (Currently Amended) The method of claim 2, wherein step (h) [(g.)] comprises selecting said at least one K compound[s] such that said at least one K compound[s] can be produced using a predetermined number [T] of reagents.
4. (Canceled)
5. (Canceled)
6. (Canceled)
7. (Currently Amended) The method of claim 1, wherein step (c[.]) comprises selecting said M compounds [from said set of F enumerated compounds] based on a fitness function.
8. (Currently Amended) The method of claim 7, wherein said focused library of at least one compound includes a plurality of compounds, further comprising [the step of]:  
(h)[g.] selecting at least one K compound[s] from said focused library of compounds [second set of S enumerated compounds] based on said fitness function, wherein [K<S] step (g) comprises outputting a list of said at least one K compound.
9. (Currently Amended) The method of claim 7, wherein said focused library of at least one compound includes a plurality of compounds, further comprising [the step of]:  
(h)[g.] selecting at least one K compound[s] from said focused library of compounds [second set of S enumerated compounds] based on said fitness function and such that said at least one K compound[s] can be produced using a predetermined number [T] of reagents, wherein

A57

[K<S] step (g) comprises outputting a list of said at least one K compound.

10. (Currently Amended) The method of claim 8, wherein step (c) comprises:
- (i)[.] [initially] selecting an initial sub-set of M compounds from said [first] set of N enumerated compounds [to produce a first sub-set of enumerated compounds];
  - (ii)[.] evaluating said [first] initial sub-set of M [enumerated] compounds based on said fitness function; and
  - (iii)[.] refining said [first] initial sub-set of M [enumerated] compounds based on said fitness function, thereby selecting said M compounds.
11. (Currently Amended) The method of claim 10, wherein step [(g.)] (h) comprises:
- (i)[.] [initially] selecting an initial sub-set of at least one K compound[s] from said [second set of enumerated] focused library of compounds [to produce a second sub-set of enumerated compounds];
  - (ii)[.] evaluating said [second] initial sub-set of at least one K [enumerated] compounds based on said fitness function; and
  - (iii)[.] refining said [second] initial sub-set of at least one K [enumerated] compound[s] based on the fitness function, thereby selecting said at least one K compound.
12. (Currently Amended) The method of claim 11, wherein [the] said fitness function is related to a diversity of a collection of compounds, and wherein step [(c.ii.)] (c)(ii) comprises evaluating [the] a diversity of said [first] initial sub-set of M [enumerated] compounds, and wherein step [(c.iii.)] (c)(iii) comprises refining said [first] initial sub-set of M compounds to increase [the] said diversity of said [first sub-set] M compounds.
- AS

13. (Currently Amended) The method of claim 12, wherein said initial sub-set of at least one K compound comprises a plurality of K compounds, wherein step [(g.ii.)] (h)(ii) comprises evaluating the diversity of said [second] initial sub-set of K [enumerated] compounds, and wherein step [(g.iii.)] (h)(iii) comprises refining said [second] initial sub-set of K compounds to increase the diversity of said [second sub-set] K compounds.
14. (Currently Amended) The method of claim 8, wherein step (c[.]) comprises:
- (i)[.] characterizing [each compound of said first set of] said N enumerated compounds;
  - (ii)[.] evaluating [each] said characterized N enumerated compounds [of said first set of enumerated compounds] based on said fitness function;
  - (iii)[.] ranking [each] said characterized N enumerated compounds [of said first set of enumerated compounds] based on said evaluation; and
  - (iv)[.] selecting said M compounds [of said first set of enumerated compounds] based on said ranking.
15. (Currently Amended) The method of claim 14, wherein said focused library of at least one compound comprises a plurality of compounds, wherein step [(g.)] (h) comprises:
- (i)[.] characterizing [each] said compounds of said [second set of enumerated] focused library of compounds;
  - (ii)[.] evaluating [each] said characterized compounds of said [second set of enumerated] focused library of compounds based on said fitness function;
  - (iii)[.] ranking [each] said characterized compounds of said focused library of compounds based on said evaluation [of said second set of enumerated compounds]; and
  - (iv)[.] selecting said K compounds [of said second set of compounds] based on said ranking.

A7

16. (Currently Amended) The method of claim 15, wherein step [(c.i.)] (c)(i) comprises characterizing [each compound of] said N [first set of] enumerated compounds using a set of molecular descriptors.
17. (Currently Amended) The method of claim 16, wherein step [(g.i.)] (h)(i) comprises characterizing [each] compounds of said enumerated focused library of compounds [second set of enumerated compounds] using said set of molecular descriptors.
18. (Currently Amended) The method of claim 15, wherein [the] said fitness function is related to a similarity to one or more query structures, and wherein step [(c.ii.)] (c)(ii) comprises evaluating similarity between [each compound of said first set of] said N enumerated compounds and [the] said one or more query structures.
19. (Currently Amended) The method of claim 18, wherein at least one of the following similarity measures is used in step [(c.ii.)] (c)(ii) for evaluating similarity between [each] said N enumerated compounds and [the] said one or more query structures:
- (1) similarity in number of atoms, bonds and rings of the same types;
  - (2) similarity in shape and surface characteristics;
  - (3) similarity in electron density distribution;
  - (4) similarity based on common substructure;
  - (5) similarity based on the presence and orientation of pharmacophoric groups;
  - (6) similarity in binding affinity; and
  - (7) similarity in degree of conformational overlap with a know receptor binder.

AM

20. (Currently Amended) The method of claim 18, wherein step [(g.ii.)] (h)(ii) comprises evaluating similarity between [each] compounds of said enumerated focused library of compounds [second set of enumerated compounds] and [the] said one or more query structures, and wherein the same similarity measure is used for evaluating similarity in step [(c.ii.)] (c)(ii) and step [(g.ii.)] (h)(ii).
21. (Currently Amended) The method of claim 14, wherein [the] said fitness function is related to at least one desired characteristic, and wherein step [(c.ii.)] (c)(ii) comprises evaluating [each compound of said first set of] N enumerated compounds to determine an extent to which [that each] the N enumerated compounds possess[es] the at least one desired characteristic.
22. (Original) The method of claim 21, wherein the at least one desired characteristic comprises at least one of the following:
- (1) a desired physical property;
  - (2) a desired chemical property;
  - (3) a desired functional property; and
  - (4) a desired bioactive property.
23. (Currently Amended) A computer based system for analyzing [selecting, based on a fitness function, one or more compounds from] a virtual [combinatorial] library [associated with R reagent combinations], comprising:  
means for selecting a [first] set of N reagent combinations from the [R reagent combinations associated with the] virtual [combinatorial] library, wherein said selected N reagent combinations represent a set of N compounds [R < N];  
means for enumerating said [first] set of N [reagent combinations to produce a first set of F enumerated] compounds;  
means for selecting M compounds of said [first] set of [F] N enumerated compounds based on [the] a fitness function [, wherein M < F];

17

means for deconvoluting said M compounds into their associated building blocks  
[reagents];  
means for generating a focused library of compounds based on said building blocks  
[reagents];  
means for enumerating a plurality of [reagent combinations] said compounds of  
[associated with] said focused library [to produce a second set of S  
enumerated] of compounds;  
means for selecting at least one K compound[s] of said [second set of] enumerated  
compounds of said focused library, based on the fitness function[, wherein  $K < S$ ]; and  
means for outputting a list of said selected at least one K compound.

24. (Currently Amended) A computer program product comprising a computer useable medium having computer program logic recorded thereon for enabling a processor to analyze [assist in selecting, based on a fitness function, one or more compounds, from] a virtual [combinatorial] library [associated with R reagent combinations], the computer program logic comprising:
- [means for enabling a] a first function that enables the processor to select a [first] set of N reagent combinations from the [R reagent combinations associated with the] virtual [combinatorial] library, wherein said selected N reagent combinations represent a set of N compounds [ $N < R$ ];
- [means for enabling a] a second function that enables the processor to enumerate said [first] set of N [reagent combinations to produce a first set of F enumerated] compounds;
- [means for enabling a] a first function that enables the processor to select M compounds of said [first] set of N enumerated compounds based on [the] a fitness function[, wherein  $M < F$ ];
- [means for enabling a] a third function that enables the processor to deconvolute said M compounds into their associated building blocks [reagents];

A 17

[means for generating] a fourth function that enables the processor to generate a  
focused library based on said building blocks [reagents];  
[means for enabling a] a fifth function that enables the processor to enumerate a  
plurality of said compounds of [reagent combinations associated with] said  
focused library [to produce a second set of S enumerated compounds]; and  
[means for enabling a] a sixth function that enables the processor to select at least one  
K compound[s] of said [second set of] enumerated compounds of said focused  
library, based on the fitness function[, wherein  $K < S$ ].

25. (Currently Amended) A computer implemented method of analyzing  
[selecting one or more compounds from] an enumerated virtual [combinatorial]  
library [associated with R enumerated compounds], comprising [the following steps]:

(a)[.] selecting a [first] set of N enumerated compounds [for the R  
enumerated compounds associated with] from the enumerated virtual [combinatorial]  
library[, wherein  $N < R$ ];

(b)[.] selecting M compounds from said [first] set of N enumerated  
compounds, wherein  $M < N$ ;

(c)[.] deconvoluting said M compounds into [reagents] associated building  
blocks; [and]

(d)[.] extracting [using said reagents to extract] an enumerated focused  
library based on said building blocks, [from said enumerated virtual combinatorial  
library], said enumerated focused library including S enumerated compounds;

(e)[.] outputting a list of at least a portion of said S enumerated compounds.

26. (Currently Amended) The method of claim 25, further comprising [the step  
of].

(f)[e.] selecting at least one K compound[s] from said S enumerated  
compounds, wherein  $K < S$ , wherein step (d) comprises outputting a list of said at  
least one K compound.

A7



27. (Currently Amended) The method of claim 26, wherein step [(e.)] (f) comprises selecting said at least one K compound[s] such that said at least one K compound[s] can be produced using a predetermined number T of reagents.

28. (Canceled)

29. (Canceled)

30. (Canceled)

31. (Currently Amended) The method of claim 25, wherein step [(b.)] (b) comprises selecting said M compounds from said [first] set of N enumerated compounds based on a fitness function.

32. (Currently Amended) The method of claim 31, further comprising [the step of]:

(f)[e.] selecting at least one K compound[s] from said S enumerated compounds based on said fitness function, wherein  $K < S$ , and wherein step (d) comprises outputting a list of said at least one K compound.

33. (Currently Amended) The method of claim 31, further comprising the step of:

(f)[e.] selecting at least one K compound[s] from said S enumerated compounds based on said fitness function and such that said at least one K compound[s] can be produced using a predetermined number T of reagents, wherein  $K < S$ , and wherein step (d) comprises outputting a list of said at least one K compound.

34. (Currently Amended) The method of claim 32, wherein step [(b.)] (b) comprises:

A7

(i)[.] [initially] selecting an initial sub-set of M compounds from said [first] set of N enumerated compounds [to produce a first sub-set of enumerated compounds];

(ii)[.] evaluating said first sub-set of M enumerated compounds based on said fitness function; and

(iii)[.] refining said [first] initial sub-set of M enumerated compounds based on said fitness function, thereby selecting said M compounds.

35. (Currently Amended) The method of claim 34, wherein step [(e.)] (f) comprises:

(i)[.] [initially] selecting an initial sub-set of at least one K compound[s] from said S enumerated compounds [to produce a second sub-set of enumerated compounds];

(ii)[.] evaluating said [second] sub-set of at least one K [enumerated] compound[s] based on said fitness function; and

(iii)[.] refining said [second] sub-set of at least one K [enumerated] compound[s] based on said fitness function, thereby selecting said at least one K compound.

36. (Currently Amended) The method of claim 35, wherein [the] said fitness function is related to a diversity of a collection of compounds, and wherein step [(b.ii.)] (b)(ii) comprises evaluating [the] a diversity of said [first] sub-set of M enumerated compounds, and wherein step [(b.iii.)] (b)(iii) comprises refining said [first] sub-set of M enumerated compounds to increase the diversity of said [first] sub-set of M enumerated compounds.

37. (Currently Amended) The method of claim 36, wherein said initial sub-set of at least one K compound comprises a plurality of K compounds, wherein step [(e.ii.)] (f)(ii) comprises evaluating the diversity of said [S] initial sub-set of K [enumerated] compounds, and wherein step [(e.iii.)] (f)(iii) comprises refining said initial sub-set of

AS

K [S enumerated] compounds to increase the diversity of said [S enumerated] K compounds.

38. (Currently Amended) The method of claim 32, wherein step [(b.)] (b) comprises:

(i)[.] characterizing [each compound of] said [first] set of N enumerated compounds;

(ii)[.] evaluating [each] said characterized [compound of said first] set of N enumerated compounds based on said fitness function;

(iii)[.] ranking [each] said characterized [compound of said first] set of N enumerated compounds; and

(iv)[.] selecting said M compounds of said [first] set of N enumerated compounds based on said ranking.

39. (Currently Amended) The method of claim 38, wherein step [(e.)] (f) comprises:

(i)[.] characterizing [each compound of] said S enumerated compounds;

(ii)[.] evaluating [each] said characterized [compound of said] S enumerated compounds based on said fitness function;

(iii)[.] ranking [each] said characterized [compound of said] S enumerated compounds; and

(iv)[.] selecting said at least one K compound[s] of said S enumerated compounds based on said ranking.

40. (Currently Amended) The method of claim 39, wherein step [(b.i.)] (b)(i) comprises characterizing [each compound of] said [first] set of N enumerated compounds using a set of molecular descriptors.

A9

41. (Currently Amended) The method of claim 40, wherein step [(b.i)] (b)(i) comprises characterizing [each compound of] said S enumerated compounds using said set of molecular descriptors.

42. (Currently Amended) The method of claim 38, wherein [the] said fitness function is related to a similarity to one or more query structures, and wherein step [(b.ii.)] (b)(ii) comprises evaluating a similarity between [each] compounds of said [first] set of N enumerated compounds and the one or more query structures.

43. (Currently Amended) The method of claim 42, wherein at least one of the following similarity measures is used in step [(b.ii.)] (b)(ii) for evaluating similarity between [each] said set of N enumerated compounds and the one or more query structures:

- (1) similarity in number of atoms, bonds and rings of the same types;
- (2) similarity in shape and surface characteristics;
- (3) similarity in electron density distribution;
- (4) similarity based on common substructure;
- (5) similarity based on the presence and orientation of pharmacophoric groups;
- (6) similarity in binding affinity; and
- (7) similarity in degree of conformational overlap with a know receptor binder.

44. (Currently Amended) The method of claim 42, wherein step [(e.ii.)] (f)(ii) comprises evaluating similarity between [each compound of] said S enumerated compounds and the one or more query structures, and wherein the same similarity measure is used for evaluating similarity in step [(b.ii.)] (b)(ii) and step [(e.ii.)] (f)(ii).

A57

45. (Currently Amended) The method of claim 38, wherein [the] said fitness function is related to at least one desired characteristic, and wherein step [(b.ii.)] (b)(ii) comprises evaluating [each compound of] said [first] set of N enumerated compounds to determine an extent that [each] said N enumerated compounds possesses the at least one desired characteristic.

46. (Currently Amended) The method of claim 45, wherein [the] said at least one desired characteristic comprises at least one of the following:

- (1) a desired physical property;
- (2) a desired chemical property;
- (3) a desired functional property; and
- (4) a desired bioactive property.

47. (Currently Amended) A computer based system for analyzing [selecting, based on a fitness function, one or more compounds from] an enumerated virtual [combinatorial] library [associated with R enumerated compounds], comprising:

means for selecting a [first] set of N enumerated from the [R enumerated compounds associated with the] enumerated virtual [combinatorial] library[, wherein  $R < N$ ];

means for selecting M compounds of said [first] set of N enumerated compounds based on the fitness function, wherein  $M < N$ ;

means for deconvoluting said M compounds into [reagents] their associated building blocks;

means for extracting an enumerated focused library, based on said [reagents] associated building blocks, from the enumerated virtual [combinatorial] library, wherein said enumerated focused library includes S enumerated compounds; and

means for selecting at least one K compound[s] of said S enumerated compounds based on the fitness function, wherein  $K < S$ .

157

48. (Currently Amended) A computer program product comprising a computer useable medium having computer program logic recorded thereon for enabling a processor to analyze [assist in selecting, based on a fitness function, one or more compounds, from] an enumerated virtual [combinatorial] library [associated with R enumerated compounds], the computer program logic comprising:

a first function that enables the [means for enabling a] processor to select a [first] set of N enumerated compounds from the [R enumerated compounds associated with the] enumerated virtual [combinatorial] library[, wherein  $N < R$ ];

a second function that enables the [means for enabling a] processor to select M compounds of said [first] set of N enumerated compounds based on the fitness function, wherein  $M < N$ ;

a third function that enables the [means for enabling a] processor to deconvolute said M compounds into associated building blocks [reagents];

means for extracting an enumerated focused library, based on said [reagents] associated building blocks, from the enumerated virtual [combinatorial] library, wherein said enumerated focused library includes S enumerated compounds; and

a fourth function that enables the [means for enabling a] processor to select at least one K compound[s] of said S enumerated compounds based on the fitness function, wherein  $K < S$ .

A7  
Cenel